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CIRCULAR NO. 135 NOVEMBER, 1930
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BLEMISHES AND DISCOLORATIONS OF MARKET ONIONS

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INTRODUCTION

In addition to the numerous diseases of onions that cause decay resulting sometimes in great loss during transit, storage, and marketing, there are several injuries of a less destructive nature that may be properly classified as blemishes. Many of these blemishes are merely discolorations of the outer dry surface scales of the bulbs, often not penetrating into the fleshy, edible portion of the onion, and are of economic importance only in influencing the marketability of affected stock. There are other blemishes, however, that not only disfigure the onions but open the way for secondary organisms that cause serious damage. The nature and causes of these discolorations and blemishes are of interest to railroad and storage companies, growers, produce dealers, inspectors, and all persons having to do with the marketing of onions. It is the purpose of this circular to describe and give the causes of the important types of onion blemishes that have been observed on the markets.

BLEMISHES AND DISCOLORATIONS CAUSED BY CHEMICALS

One of the most common types of discoloration of onions caused by chemicals is illustrated by the " scorched spot " and " bag print " blemishes sometimes found on colored onions that have been in contact with moist bags, or on stock that has been in damp storage for some time. Small oval spots varying in size from one-half inch to 1 inch in diameter are produced on the sides of the onions that come in contact with the fabric. Sometimes the spots are uniformly dark-brown or black, as if the onions had been scorched (fig. 1, A), and sometimes the mesh of the bag is distinctly printed in dark brownish black on the onion scales (fig. 1, B). This discoloration is caused by a chemical in the fabric of the bag that produces an alkaline reaction with the color pigments of those scales in contact with the fabric. If the bag is moist, the discolored areas are uniformly brown or black, but if it is comparatively dry the diffusion of the chemical is slight, and the color change takes place so slowly that the imprints of the individual meshes of the fabric become prominent. In connection with a discoloration of this type, however, no injury to the underneath fleshy scales that would impair the eating qualities of the onion has ever been observed.

All onion bags do not give this chemical reaction; consequently such blemishes are likely to be more or less sporadic and generally are not of a serious nature.

A more uniform and severe type of discoloration caused by a chemical is occasionally found in onions that have come out of cold storage. This type is caused by the accidental exposure of the stock to ammonia fumes from the storage plant. The fumes cause an alkaline reaction with the color pigments in the outer scales of the onions and often produce such pronounced discoloration that the marketability of the stock is greatly reduced. (Fig. 1, D.) As a result of exposure to ammonia fumes yellow onions show brown blotches or a uniform brown color over all the exposed surfaces; red onions change to a deep greenish black or metallic-black color; and white onions are discolored greenish yellow. If onions are exposed to strong fumes for several hours the fleshy, edible portion of the bulbs becomes watery, yellowish green, and worthless.

Experiments have shown that ammonia injury will take place at a temperature as low as 31.5° F. and that the rate and severity of discoloration are approximately the same as at higher temperatures. The color changes have been found to take place more rapidly in a humid atmosphere or when the onions are slightly moist. Less than 1 per cent of ammonia in the air will cause marked discoloration if the onions are exposed for 24 hours or longer. With stronger concentrations the color changes are noticeable almost immediately and large brownish-black blotches are produced within a few minutes.

A similar type of discoloration in colored onions has been observed in stock that had been covered with manure for protection against freezing. The ammonia fumes from the manure cause almost a complete blackening of the outer dry colored scales, but generally do not discolor the fleshy scales. (Fig. 1, E.)

In all the injuries described above, the strength of the chemicals, the humidity of the atmosphere or surface moisture on the produce, and the duration of the exposure determine the extent of the injury.

BLEMISHES AND DISCOLORATIONS CAUSED BY SUNLIGHT

Onions grown in regions where the temperature is high and the sunlight extremely bright are often severely affected with sun scald. This injury takes place at harvesting time when the bulbs are exposed to heat and bright sunlight. The more immature and moist onions are generally injured more severely. The tissues of the exposed area of the onion are killed and become soft and slippery, but soon lose moisture rapidly by evaporation, thus causing sunken leatherlike areas which are generally bleached almost white. The size of the scalded areas varies from one-half inch to 1½ inches in diameter, depending on the exposure and the size of the onion.

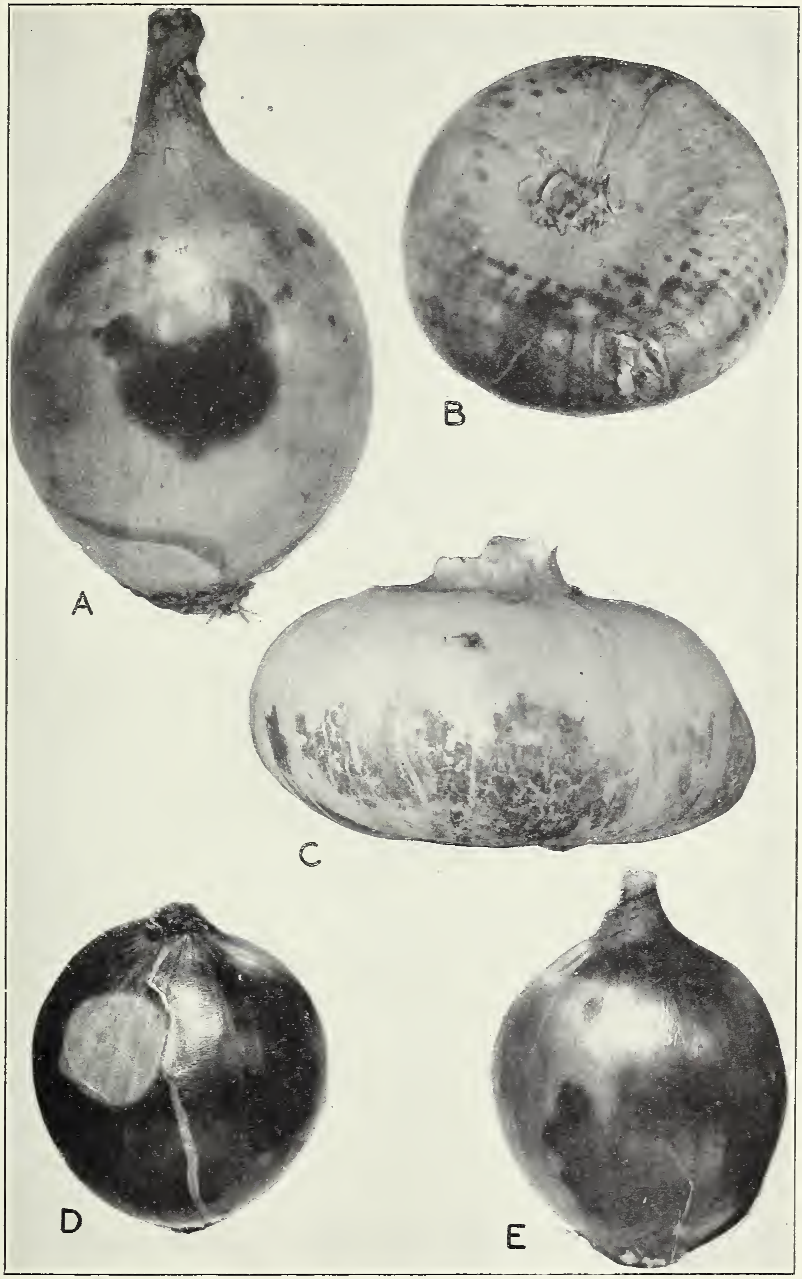

FIGURE 1.—BLEMISHES OF ONIONS

A, Yellow onion, showing dark brownish-black spot caused by an alkali in the fabric of the bag under wet conditions; B, yellow onion, showing print of bag caused by an alkali in the fabric of the bag under moderately dry conditions; C, white onion, showing black discoloration of the outer dry scales caused by a dark mold (Macrosporium); D, yellow onion, discolored dark brownish black by strong ammonia fumes (note white spot where the skin was protected from the fumes); E, yellow onion, showing brownish black discoloration caused by ammonia fumes from manure

Sun scald is often a serious factor in marketing onions, not only on account of the blemishes but because various bacteria and other organisms enter through the dead area and cause decay during transit and marketing. Slimy soft rot is usually the most important disease that follows sun scald.

A slightly different type of injury caused by sunlight is known as sunburn, or greening. This is caused by exposure of the bulb to moderate light during the growing period or after harvesting. The sunlight causes a development of green coloring matter in the exposed tissues, but does not cause death or softening of the affected region. Sunburned tissues are bitter and unpalatable, but since there is no danger of decay following, the marketability of onions so affected is not greatly influenced unless the lot as a whole shows this blemish quite prominently.

BLEMISHES AND DISCOLORATIONS CAUSED BY FUNGI

There are several fungous diseases of onions that cause more or less severe injury. Most of these are described and pictured in Farmers' Bulletin No. 1060, Onion Diseases and Their Control, and consequently will not be discussed in this circular. The most common diseases that are generally in the nature of blemishes are described in the above-mentioned bulletin under the headings Smudge, Black Mold, and Purple Blotch.

There is, however, a rather severe type of blemish found in California Bermuda onions that apparently has never been described. Growers and inspectors usually refer to this blemish as "soil stain," but recent investigations by the writer show that the injury is caused by a dark-colored fungus (Macrosporium) within the tissues of the dry outer scales. In white onions the lower halves of the bulbs are discolored grayish black by this fungus. (Fig. 1, C.) Yellow onions are discolored a dark brown. In all instances the fungus seems to stop growth when it reaches the median line representing the circumference of the bulb, the upper half of the onion remaining free from infection. In even the most severely discolored specimens no decay has been found, thus indicating that under usual growing conditions the fungus does not penetrate into the fleshy scales of the onions.

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